

## Old Collections Add a New Species to Virginia's Ensign Wasp (Hymenoptera: Evaniidae) Fauna

Kal Ivanov

Department of Recent Invertebrates  
Virginia Museum of Natural History  
21 Starling Avenue  
Martinsville, Virginia 24112  
kal.ivanov@vmnh.virginia.gov

### ABSTRACT

*Evania appendigaster* (L.), an egg predator of household cockroaches, is newly recorded for the fauna of Virginia based on an 80-year-old specimen at the Virginia Museum of Natural History. With the inclusion of this species all seven eastern evaniid taxa are now known to occur in the state. This finding is further evidence for the value of research collections in documenting the world's biodiversity.

**Key words:** *Evania appendigaster*, cockroach egg predators, new state record, eastern US, research collections.

### INTRODUCTION

Evaniids (Hymenoptera: Evaniidae) are a small group of egg predators on cockroaches (Dictyoptera: Blattodea). Females oviposit in the ootheca (egg case) and the immature stages develop as solitary predators consuming the eggs. There are surprisingly few host records for the group, but known associations suggest that each evaniid species specializes on egg cases of a particular size, rather than on those of (a) particular host taxon/taxa (Townes, 1949; Roth & Willis, 1960; Deyrup & Atkinson, 1993).

The adults are small to medium-sized dark colored wasps that are readily distinguished by the small and strongly laterally compressed metasoma. The group is common across the world but reaches its highest diversity in the warm, humid environments of the lower latitudes where their hosts abound. The family contains approximately 580 described species in 21 extant genera (Deans, 2005; Mullins et al., 2012). This predominantly tropical group is represented in the Nearctic Region (north of Mexico) by eleven species belonging to four genera: *Evania* (1 sp.), *Prosevania* (1 sp.), *Evaniella* (3 spp.), and *Hyptia* (6 spp.) (Townes, 1949; Deans, 2005). To date, seven species have been recorded from the eastern part of the continent (Townes, 1949; Smith, 1998). These include two introduced egg predators (*Evania appendigaster* [Linnaeus, 1758] and *Prosevania*

*fuscipes* [Illiger, 1807]) of domestic cockroaches, and five native taxa (*Evaniella semaeoda* Bradley, 1908, *Hyptia floridana* Ashmead, 1901, *H. harpyoides* Bradley, 1908, *H. reticulata* [Say, 1836], and *H. thoracica* [Blanchard, 1840]) which use egg cases of cockroaches in the genera *Parcoblatta*, *Ischnoptera*, *Cariblatta*, and possibly other wood cockroaches (Blattodea: Ectobiidae) found in the eastern forests (Deyrup & Atkinson, 1993).

The evaniid fauna of the mid-Atlantic states (Delaware, District of Columbia, Maryland, West Virginia, and Virginia) was reviewed recently by Smith (1998, 2011), who reported all seven eastern species from the area. Of these, only the non-native *E. appendigaster* did not appear on the Virginia list.

### MATERIALS

While curating uncatalogued specimens at the Virginia Museum of Natural History (VMNH), I encountered a single male *E. appendigaster* which represents the first known Virginia record of this species. The specimen (VMNH accession # 1991-084), collected in 1937, remains in good condition lacking only the two terminal segments of the left antenna, the hind tarsi, and the right hind tibia (Fig. 1). It bears two labels: 1) top label is handwritten and reads "Richmond Dairy Co."; 2) bottom label is printed, with collector's name and date



Fig. 1. *Evania appendigaster* (Richmond, VA) lateral view, forewing length 5.8 mm.

handwritten, and reads “R. Murrill U. of Richmond, Va. 15 x 1937.”

Review of associated documentation revealed that the specimen was originally part of the University of Richmond student insect collection. The entire collection was acquired by, and transferred to, VMNH in 1991 along with approximately 22,000 other pinned insects. Although the Richmond Dairy Company ceased operation in 1970, the building where the specimen was collected still exists at its original location near downtown Richmond at approximately N37.54752°, W077.44370°.

### RECOGNITION

Members of *Evania* are characterized by their larger size, elongated hind legs, widely separated middle and hind coxae, and by their somewhat flattened faces (Deans & Huben, 2003). As currently understood, the group comprises 66 valid species (33 confirmed and 33 *incertae sedis*) with a worldwide distribution (Deans, 2005).

The relatively large size (forewing length 5.5–7.0 mm) of *E. appendigaster* will readily separate it from all other Nearctic forms (forewing length  $\leq 5.0$  mm), with the exception of *P. fuscipes*. From the latter it can be distinguished by a number of features: 1) wide separation of the middle and hind coxae with the distance approximately twice the length of the middle coxa; this distance is subequal to the length of the middle coxa in *P. fuscipes*; 2) rounded pronotal shoulders which lack a sharp transverse ridge; 3) smooth face with fine, sparse punctures as opposed to a coarsely striato-punctate face; and 4) pleura with sparse, separate punctures rather than close, reticulate punctures.

Keys to the Nearctic species of Evaniidae can be found in Townes (1949) and for the eastern fauna in Smith (1998).

### DISCUSSION

Based on specimens from Washington, D.C., the presence of this wide-ranging species in Virginia was expected (Smith, 2011) but, to date, no specimens have been available for study despite intensive collecting in the area (Smith, 1998, 2011). With the inclusion of this species all seven eastern evaniid taxa are now known to occur in the state.

As with many other introduced species, *E. appendigaster* presumably was transferred, along with its hosts, to new areas via human commerce. It is one of the world's most widely distributed evaniids and now is nearly cosmopolitan. It occurs in most tropical and subtropical areas with its known range extending farther into the Palearctic and Nearctic regions (Deans, 2005). The origin of *E. appendigaster* is not known but, based on the diversity and distribution of closely related *Evania* species, Townes (1949) argued that it originated in the Oriental Region.

*Evania appendigaster* is the less common of the two introduced species that have become established in North America (Smith, 1998). The earliest known United States (and North American) record of this species is a specimen collected in Washington, D. C. in June 1879 (Townes, 1949). It has been reported subsequently from Alabama, Arizona, California, Florida, Georgia, Hawaii, Louisiana, Massachusetts, Missouri, New Mexico, New York, Ohio, Pennsylvania, South Carolina, Tennessee, and Texas (Swezey, 1929; Townes, 1949; Smith, 1998; Gulmahamad, 2007; Bug Guide, 2017). In the United States, this species is exclusively associated with urban areas where its hosts are found (Townes, 1949; Smith, 1998; Deans, 2005). Although it is more commonly found in the Atlantic and Gulf Coast states, it is very likely that this species occurs in all major urban centers across the country. Where they occur, these wasps are occasionally seen on the windows of city buildings and people's homes.

In different parts of the world, this species is a well-known egg predator of household cockroaches which produce larger oothecae, particularly *Blatta orientalis* Linnaeus, 1758, *Periplaneta americana* (Linnaeus, 1758), *P. australasiae* Fabricius, 1775 (Townes, 1949; Stange, 1978), and possibly *Melanozosteria soror* (Brunner von Wattenwyl, 1865) and *Neostylopyga rhombifolia* (Stoll, 1813) (Swezey, 1929). Detailed natural history information, including oviposition behavior and development, can be found in Haber

(1920), Cameron (1957), and Roth & Willis (1960). The potential of this species as a biocontrol agent of the American cockroach, *P. americana*, was reviewed by Fox & Bressan-Nascimento (2006).

The finding of *E. appendigaster* among materials at the VMNH is further testament to the important role of research collections for the study of the world's biodiversity. The specimen was collected eighty years ago but the presence of this species in Virginia went undocumented until now. Museum, university, and private collections provide indispensable documentation of the world's flora and fauna, their environment, biological associations, and the changes in their distribution through both space and time (Suarez & Tsutsui, 2004).

Since the time it was acquired by the VMNH, the now defunct University of Richmond student insect collection has provided materials forming the bases of at least nine scientific publications (Hoffman, 1992, 1994, 2006, 2012; Smith, 2006; Evans & Flint, 2009; Bedell, 2010; Hoffman & Roble, 2012; Roble & Hoffman, 2012). These publications range from single species accounts to detailed regional studies of higher taxa, and have produced at least four new state records and associated distributional and biological information for eleven families in six insect orders. Without the long-term support and funding of these collections, the information and knowledge they can provide undoubtedly will be lost. This is especially relevant in the current era of fast environmental change. In the future, research collections will become increasingly important in providing the bases for understanding how such changes affect extant (or recently extinct) taxa.

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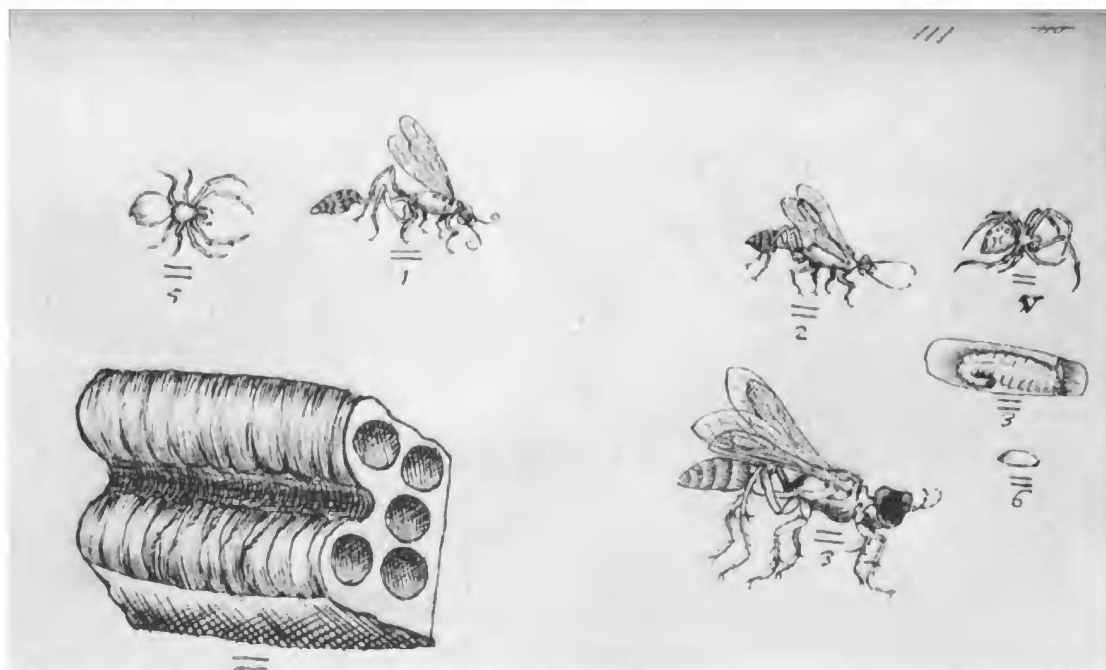
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